Μ.ΔΙ.Π.
ΔΗΜΟΚΡΙΤΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΡΑΚΗΣ

COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Sciences		
ACADEMIC UNIT	Department of Informatics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	705SKOC	**SEMESTER**	7ο
COURSE TITLE	INTRODUCTION TO COMPUTER VISION		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	2	5
Tutorial Exercises	1	
Lab Exercises	1	
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Scientific Area
PREREQUISITE COURSES:	Digital Image Processing
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The course aims to familiarize students with the basic principles of computer vision as well both theoretically and practically. The primary objective of the course is the promotion the importance of the research topic of computer vision and the role it has in the modern world. This goal is pursued through parallelism with the abilities of human vision. Within this course, several processing stages are presented that are required to achieve the vision function of a system computer - camera. It is very important to emphasize that the main objective of the course is the analysis and implementation of algorithms that support a typical artificial vision system. The expected learning outcomes of the course are summarized below

- Locating regions of interest in an image.
- Modeling and measuring features of regions of interest in an image.
- Design of a typical artificial vision system.
- Using the OpenCV library to use known artificial vision algorithms.
- Experimenting with various artificial vision algorithms.
- Problematization of the performance of known algorithms and development of new ones.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*

Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

- Search, analysis and synthesis of data and information, using the necessary technologies
- Team work
- Promotion of free, creative and inductive thinking

(3) SYLLABUS

- Basic concepts of human vision function.
- Sensors and imaging.
- Basic concepts of computer vision.
- Computer vision in 2 and 3 dimensions (2-D and 3-D).
- Stereoscopic vision.
- Object detection.
- Motion analysis.
- Scene understanding.
- Distributed camera networks.
- Analysis and use of image depth.
- Image segmentation.
- Feature detection and identification (SIFT, SURF, etc).
- Visual analysis of people (face recognition, expressions, etc.).
- Feature extraction.
- Applications of computer vision.
- Familiarity with OpenCV library..

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Website of the course with supporting and auxiliary material. Communication software with students through the e-class electronic platform to share course announcements, notes and exercises.
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Activity	***Semester workload***
Lectures	26x2=52
Tutorial Exercises: Selected, representative exercises are solved concerning different modules of the course.	13x2=26
Project	26
Written Exams	2x1=2
Individual Study	19
Course total	***125***

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	**Theory** Final written exam (60%) which includes: • Multiple choice questions • Theoretical test questions • Problem solving Team Project (40%)

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- R. Szeliski, “Computer Vision: Algorithms and Applications”, 1η Έκδοση, Springer, 2011.
- D. Forsyth and J. Ponce, “Computer Vision: A Modern Approach”, 2η Έκδοση, Prentice Hall,
- 2011.
- G. Bradski and A. Kaehler, “Learning OpenCV: Computer Vision with the OpenCV Library”, 1st Edition, O'Reilly Media, 2008.

- Related academic journals:

- International Journal of Computer Vision
- IEEE Trans. on Pattern Analysis and Machine Intelligence
- IET Computer Vision
- Image and Vision Computing